

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of the Claims:

Claim 1 (original): A method for determining whether a test subject has at least one auto-immune disease comprising

- a) obtaining blood from the predetermined test subject thus obtaining a test sample;
- b) obtaining blood from a non-autoimmune subject thus obtaining a control sample;
- c) contacting the test sample and the control sample with a combination of at least one detectably-labeled anti-CD4 antibody and at least one detectably-labeled anti-CD40 antibody;
- d) detecting the level of CD4^{lo} CD40^{hi} T cells in the test sample and in the control sample;

wherein when there is an increase in the level of CD4^{lo} CD40^{hi} T cells in the test sample as compared to the level of CD4^{lo} CD40^{hi} T cells in the control sample, the test subject has at least one auto-immune disease.

Claim 2 (original): The method of claim 1 further comprising isolating the test sample CD4^{lo} CD40^{hi} T cells and the control sample CD4^{lo} CD40^{hi} T cells from part 1d) and determining the presence or absence of an increase in production of at least one cytokine in the test T cell population as compared to the sample T cell population.

Claim 3 (currently amended): The method of claim 2 wherein said cytokine is at least one cytokine selected from the group consisting of IL-2 (interleukin-2), IL-4 (interleukin-4), IL-6 (interleukin-6), IL-10 (interleukin-10), TGF β (transforming growth factor β) and IFN γ (interferon- γ).

Claim 4 (original): The method of claim 1, wherein the auto-immune disease is selected from the group consisting of type 1 diabetes, rheumatoid arthritis, lupus, multiple sclerosis,

atherosclerosis, Crohn's colitis, ulcerative gastritis, primary biliary cirrhosis, chronic obstructive pulmonary disease (COPD) and scleroderma.

Claim 5 (original): The method of claim 4, wherein the auto-immune disease is type 1 diabetes.

Claim 6 (original): The method of claim 4, wherein the COPD disease is emphysema.

Claim 7 (original): The method of claim 1, wherein said detecting is by flow cytometry.

Claim 8 (original): The method of claim 1, wherein said subject is human.

Claim 9 (withdrawn): A method for determining whether a predetermined test subject is susceptible to developing at least one predetermined auto-immune disease comprising

- a) obtaining a first sample of blood from said predetermined test subject;
- b) obtaining a second sample of blood from said same subject;
- c) detecting the CD4^{lo} CD40^{hi} T cell population in said first and second samples;
- d) contacting said second test sample with at least one predetermined antigen

indicative of at least one predetermined auto-immune disease for a length of time and in an amount sufficient to obtain a positive or negative cellular response in the CD4^{lo} CD40^{hi} T cell population of said second sample,

- e) determining whether a positive or negative cellular response occurs in the CD4^{lo} CD40^{hi} T cell population of said first and said second samples by measuring at least one response selected from the group consisting of CD4^{lo} CD40^{hi} T cell proliferation, CD4^{lo} CD40^{hi} T cell death and CD4^{lo} CD40^{hi} cytokine production,

wherein when a positive response occurs in the CD4^{lo} CD40^{hi} T cell population of the second sample as compared to the response from the CD4^{lo} CD40^{hi} T cell population of the first sample, the predetermined subject is susceptible to developing the at least one predetermined autoimmune disease.

Claim 10 (withdrawn): The method of claim 9, wherein a positive response is an increase in CD4^{lo} CD40^{hi} T cell proliferation, an increase in CD4^{lo} CD40^{hi} T cell death and an increase in production of at least one cytokine produced by said CD4^{lo} CD40^{hi} T cell population.

Claim 11 (withdrawn): The method of claim 10 wherein said at least one cytokine is selected from the group consisting of IL-2, IL-4, IL-6, IL-10, TGF β and IFN γ .

Claim 12 (withdrawn): The method of claim 9 wherein said at least one preselected auto-immune disease is type 1 diabetes and said antigen is pancreatic tissue.

Claim 13 (withdrawn): The method of claim 9 wherein said at least one preselected auto-immune disease is rheumatoid arthritis and said antigen is synovial tissue.

Claim 14 (withdrawn): The method of claim 9, wherein said at least one preselected auto-immune disease is multiple sclerosis and said antigen is nervous tissue.

Claim 15 (withdrawn): The method of claim 9, wherein said at least one preselected auto-immune disease is scleroderma and said antigen is skin tissue.

Claim 16 (withdrawn): The method of claim 9, wherein said at least one auto-immune disease is atherosclerosis and said antigen is cardiac tissue.

Claim 17 (withdrawn): The method of claim 9, wherein said subject is human.

Claim 18 (withdrawn): A method of modulating the proliferation of CD4^{lo} CD40^{hi} T cells in a subject in need of said modulation comprising at least one method selected from the group consisting of

- a) contacting said subject with at least one agent which inhibits the activation of RAG recombinase activity;
- b) contacting said subject with an antibody molecule, or fragment thereof, to CD40;

- c) contacting said subject with an antibody molecule, or fragment thereof, to CD154;
- d) contacting said subject with at least one blocking peptide to prevent interaction of the CD40 receptor with the CD154 ligand;
- e) contacting said subject with at least one RNA molecule specifically hybridizing to the RAG2 gene product; and,
- f) contacting said subject with at least one RNA molecule specifically hybridizing to the RAG1 gene product;

wherein said contacting is for a length of time sufficient and in an amount sufficient to modulate the proliferation of CD4^{lo} CD40^{hi} T cells in said subject.

Claim 19 (withdrawn): The method of claim 18, part a), wherein said at least one agent is a chaetochromin or a derivative thereof.

Claim 20 (withdrawn): The method of claim 18, part b), wherein said antibody fragment is an Fab portion.

Claim 21 (withdrawn): The method of claim 18, part c), wherein said antibody fragment is an Fab portion.

Claim 22 (withdrawn): The method of claim 18, part d), wherein said blocking peptide is selected from the group consisting of SSKTTSVLQWAEKGYTMSNNLVT (SEQ ID NO: 7) and QIAAHVISEASSK (SEQ ID NO: 8).

Claim 23 (withdrawn): The method of claim 18, part e), wherein said RNA molecule is selected from the group consisting of

5'-AUGUCUCUGCAGAUGGUAACdAdG-3' (SEQ ID NO: 9);

5'-CUGUUAACCAUCUGCAGAGACdAdU-3' (SEQ ID NO: 10);

5'-GGUAGGAGAUCUUCCUGAAGdCdC-3' (SEQ ID NO: 11);

5'-GGGGAUGGGCACUGGGUCCAUGdCdU-3' (SEQ ID NO: 12);

5'-AGCAUGGACCCAGUGCCCAUCCdCdC-3' (SEQ ID NO: 13); and,

5'-CUGUUACCAUCUGCAGAGACdAdU-3' (SEQ ID NO: 14).

Claim 24 (withdrawn): The method of claim 18, part f), wherein said RNA molecule is selected from the group consisting of

5'-AUGGCAGCCUCUUUCCCACCCAdCdC-3' (SEQ ID NO: 15);

5'-GGUGGGUGGGAAAGAGGCUGCCdAdU-3' (SEQ ID NO: 16);

5'-AAACUUGCAGCUCAGCAAAAAACdTdC-3' (SEQ ID NO: 17);

5'-GAGUUUUUUGCUGAGCUGCAAGUdUdU-3' (SEQ ID NO: 18);

5'-GAGUUUUUUGCUGAGCUGCAAGUdUdU-3' (SEQ ID NO: 19);

5'-UCACAAAACCCUGGCCCAUGUdCdC-3' (SEQ ID NO: 20); and,

5'-GGAACAUGGGCCAGGGUUUUGUdGdA-3' (SEQ ID NO: 21).

Claim 25 (withdrawn): The method of claim 18, wherein said subject has an increased level of CD4^{lo}CD40^{hi} T cells as compared to the level of CD4^{lo}CD40^{hi} T cells in a non-auto-immune subject and the modulation is a decrease in the level of CD4^{lo}CD40^{hi} T cells.

Claim 26 (withdrawn): The method of claim 18, wherein said subject is human.

Claim 27 (original): A kit for detecting CD4^{lo}CD40^{hi} T cells comprising

a) at least one detectably labeled anti-CD4 antibody and at least one detectably labeled anti-CD40 antibody; and,

b) at least one predetermined antigen indicative of at least one predetermined auto-immune disease.